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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/534,633	05/11/2005	Avto Tavkhelidze	12091	8643
7590 05/05/2006				
Borealis Technical 23545 NW Skyline Blvd North Plains, OR 97133-9205		EXAMINER LIU, BENJAMIN T		
		ART UNIT 2826		
DATE MAILED: 05/05/2006				

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

10/534,633

Applicant(s)

TAVKHELIDZE ET AL.

Examiner

Benjamin T. Liu

Art Unit

2826

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.


- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 11 May 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-21 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-21 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

  
**Minhloan Tran**  
**Primary Examiner**  
**Art Unit 2826**

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 11 May 2005 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date 5/11/05.

- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_.

## DETAILED ACTION

### *Claim Rejections - 35 USC § 102(e)*

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 1-4, 6-10, 12-16, and 18-21 are rejected under 35 U.S.C 102(e) as being anticipated by Martinovsky et al. (6,876,123).

With regard to claim 1, figure 1d of Martinovsky et al. discloses a thermotunneling device comprising a collector electrode 4, an emitter electrode 1 and an insulator layer 2, wherein the insulator layer is disposed between the emitter electrode 1 and the collector electrode 4, and is touching the collector electrode 4.

With regard to claim 2, figure 1d of Martinovsky et al. discloses a thermotunneling device in which the insulator layer 2 comprises a metal oxide. (Note line 58 in column 1 of Martinovsky et al.)

With regard to claim 3, figure 1d of Martinovsky et al. discloses a thermotunneling device in which the metal oxide is aluminum oxide. (Note line 58 in column 1 of Martinovsky et al.)

With regard to claim 4, figure 1d of Martinovsky et al. discloses a thermotunneling device in which the distance between the electrodes (1, 2) is 40 Å, which is in the range of 10 - 200Å. (Note lines 5-6 in column 2 of Martinovsky et al.)

With regard to claim 6, figure 1d of Martinovsky et al. discloses a thermotunneling device in which the emitter electrode 1 comprises a metal. (Note lines 53-54 in column 1 of Martinovsky et al.)

With regard to claim 7, figure 1d of Martinovsky et al. discloses a thermotunneling device in which the collector electrode 4 comprises a metal. (Note lines 53-54 in column 1 of Martinovsky et al.)

With regard to claim 8, figure 1d of Martinovsky et al. discloses a method for enhancing electron tunneling between an emitter 1 and collector electrode 4 comprising the step of contacting the collector electrode 2 with an insulator 2, and placing the insulator 3 between the collector electrode 4 and the emitter electrode 1.

With regard to claim 9, figure 1d of Martinovsky et al. discloses a method in which the insulator layer 2 comprises a metal oxide. (Note line 58 in column 1 of Martinovsky et al.)

With regard to claim 10, figure 1d of Martinovsky et al. discloses a method in which the metal oxide is aluminum oxide. (Note line 58 in column 1 of Martinovsky et al.)

With regard to claim 12, figure 1d of Martinovsky et al. discloses a method in which the distance between the electrodes (1, 2) is 40 Å, which is in the range of 10 - 200Å. (Note lines 5-6 in column 2 of Martinovsky et al.)

With regard to claim 13, figure 1d of Martinovsky et al. discloses a method in which the emitter electrode 1 comprises a metal. (Note lines 53-54 in column 1 of Martinovsky et al.)

With regard to claim 14, figure 1d of Martinovsky et al. discloses a method in which the collector electrode 4 comprises a metal. (Note lines 53-54 in column 1 of Martinovsky et al.)

With regard claim 15, figure 1d of Martinovsky et al. discloses a method for cooling comprising the steps: (a) applying a bias voltage to an emitter electrode 1; (b) placing a collector electrode 4 a distance  $d_0 = 40\text{\AA}$  from the emitter electrode 1; (c) placing an insulator layer 2 a distance  $d_1 = 0$  from the emitter electrode 1; and (d) contacting the insulator layer 2 and the collector layer 4, whereby electrons tunneling from the emitter electrode 1 to the collector electrode 4 and the emitter electrode 1 thereby cooling the emitter electrode 1. (Note lines 28-30 in column 8 of Martinovsky et al.)

With regard to claim 16, figure 1d of Martinovsky et al. discloses a method in which the distance between the electrodes (1, 2) is 40 Å, which is in the range of 10 - 200Å. (Note lines 5-6 in column 2 of Martinovsky et al.)

With regard to claim 18, figure 1d of Martinovsky et al. discloses a method in which the insulator layer 2 comprises a metal oxide. (Note line 58 in column 1 of Martinovsky et al.)

With regard to claim 19, figure 1d of Martinovsky et al. discloses a method in which the metal oxide is aluminum oxide. (Note line 58 in column 1 of Martinovsky et al.)

With regard to claim 20, figure 1d of Martinovsky et al. discloses a method in which the emitter electrode 1 comprises a metal. (Note lines 53-54 in column 1 of Martinovsky et al.)

With regard to claim 21, figure 1d of Martinovsky et al. discloses a method in which the collector electrode 4 comprises a metal. (Note lines 53-54 in column 1 of Martinovsky et al.)

***Claim Rejections - 35 USC § 103***

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 5, 11, and 17 are rejected under 35 U.S.C 103(a) as being unpatentable over Martinovsky et al. (6,876,123) in view of Tavkhelidze et al. (6,417,060).

With regard to claim 5, figure 1d of Martinovsky et al. discloses all the subject matter claimed except for the distance between the emitter and the insulator layer in the range of 5 - 50A.

However, figures 4 and 5 of Tavkhelidze et al. disclose a distance between the emitter and collector in the range of 50A, which is in the range of 5-50A. (Note lines 6-7 of column 5 of Tavkhelidze et al.)

Therefore, it would have been obvious to one of ordinary skill in the art to form the collector and insulator of Martinovsky et al. at a distance of 5nm away from the emitter as taught by Tavkhelidze et al. in order to allow electron tunneling to occur optimally. (Note lines 32-35 in column 2 and lines 29-33 in column 6 of Tavkhelidze et al.)

With regard to claim 11, figure 1d of Martinovsky et al. discloses all the subject matter claimed except for the distance between the emitter and the insulator layer in the range of 5 - 50A.

However, figures 4 and 5 of Tavkhelidze et al. disclose a distance between the emitter and collector in the range of 50A, which is in the range of 5-50A. (Note lines 6-7 of column 5 of Tavkhelidze et al.)

Therefore, it would have been obvious to one of ordinary skill in the art to form the collector and insulator of Martinovsky et al. at a distance of 5nm away from the emitter as taught by Tavkhelidze et al. in order to allow electron tunneling to occur optimally. (Note lines 32-35 in column 2 and lines 29-33 in column 6 of Tavkhelidze et al.)

With regard to claim 17, figure 1d of Martinovsky et al. discloses all the subject matter claimed except for the distance between the emitter and the insulator layer in the range of 5 - 50A.

However, figures 4 and 5 of Tavkhelidze et al. disclose a distance between the emitter and collector in the range of 50A, which is in the range of 5-50A. (Note lines 6-7 of column 5 of Tavkhelidze et al.)

Therefore, it would have been obvious to one of ordinary skill in the art to form the collector and insulator of Martinovsky et al. at a distance of 5nm away from the emitter as taught by Tavkhelidze et al. in order to allow electron tunneling to occur optimally. (Note lines 32-35 in column 2 and lines 29-33 in column 6 of Tavkhelidze et al.)

3. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Benjamin T. Liu whose telephone number is (571) 272-6009. The examiner can normally be reached on Mon-Fri 9:30 AM-6:00AM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nathan Flynn can be reached on 571 272 1915. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



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